# LEILA BENALI

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**Nobuo TANAKA**

We may come back to this Iranian issue later, but let us move to Leila.

**Leila BENALI**

We are at the end of the second day of the World Policy Conference, so I will not insist again on the fact that the global context has changed again over the last decade. After the very comprehensive and excellent picture that Olivier has shared with us about all the aspects that have changed over the last decade, I will just focus on a couple of points. There are a couple of subtle trends that have been changing over the last 10 years and have gone a little bit more unnoticed than the rest.

Regarding the first point that I wanted to mention, over lunch, Mr Bakkoury rightly pointed out that for example, solar PV module costs have decreased over time. They dropped by 80% between 2010 and 2017. That is a massive drop. However, I want to insist on another cost decrease that is happening in the energy sector, and that is energy storage, electricity storage. I agree that that is mostly driven by EV batteries, but at the same time, it is quite important to mention those cost drops that we have seen in batteries, including in grid-scale stationary applications.

Electricity storage costs in general have been decreasing by 60-80% since 2010. They are expected to drop by the various agencies, investment banks, and researchers by an additional 50-60% by 2030. However, I want to point out the great uncertainty that is prevailing in these outlooks. There is great uncertainty because we do not know which technology, which chemistry will prevail. We do not know which R&D money will be put in those technologies or where the manufacturing capabilities will be focused or concentrated in the next few years. There is government support. How will government support evolve over time?

However, it is fair to say we will see some additional cost decreases in energy storage across the board. The implication for me or the implication for any energy player in the scene, companies and countries alike, is a race. It is a race to gain leadership in technologies, and beyond that, a race to secure access to the materials and commodities that are underlying these storage technologies. I will give some examples later on. The second point is about the second subtle change that I am seeing at least in the energy sector over the last decade. There has been an unprecedented volatility in oil prices and it has been widely documented in the press and we all know about it. Oil prices increased to USD 140 in 2008 before dropping to USD 20-30, and now we are in that 70-80 band, around that.

Here again, we could argue that this is just another commodity cycle, and nobody likes commodity cycles. It is an uncertainty that we have to live with, and the industry has been very used to living with this sort of uncertainty. The implication of this volatility is every planner's nightmare. We are in a situation where, by 2040, oil demand outlooks can decrease from today's market of around 100 million barrels a day to 80 million barrels a day or increase to 120-150 million barrels a day.

When you are in an industry with huge capital investment programmes, it is a nightmare to be able to plan in those circumstances. Today, that gives another type of race as well, a race for cost leadership, a race for profitability, but also a race to guarantee some sort of security of demand. That security of demand is slightly different from the traditional definition of security of demand that we have seen over the last two decades in the oil markets.

We are seeing several players today investing in securing demand for oil and gas in established markets. You invest in making sure that internal combustion engines continue to be the engines of the future for sustainable transport. You continue to invest in low-emission fuels and in on-board $CO_2$ capture. We see that in the heavy-duty vehicles in the shipping industry as well. We are seeing a lot of changes happening there, in those established markets.

However, you also see another trend in a race to capture market share in new markets for crude and gas. I am thinking here about petrochemicals, plastics, polymers for crude and for oil products in general, and transportation for gas. In this context, and in the discussion to prepare for this panel, we talked a lot about rivalries, and I prefer to use the term shifting alliances. There will be a lot of shifting alliances and there will be a lot of proactive strategies. I prefer to use this term.

We should not forget something in addition to the traditional alliances that we are used to in this highly capital-intensive sector: alliances today in many cases are being driven by large corporations, private corporations, but also increasingly, by large sovereign funds. There are other national champions of new forms and national oil companies. These are large national oil companies which in many cases are being seen as competing with each other because they are pursuing similar objectives and similar strategies.

They all want business integration. They all want downstream investment, and they all want global footprint because there is a limit to what you can achieve in your domestic market. There is a limit to what you can sell in your domestic market, especially if you are heavily exposed to mature domestic assets. These proactive strategies that I have been talking about, or those shifting alliances, are driven by three key aspects.

The first one is, as I mentioned, the race to secure market share by making sure that we continue to be low cost as much as possible. Optimal extraction of resources is increasingly important for capital discipline, especially following the volatility of oil prices that we have seen. In addition to the low-cost position, this will be coupled increasingly with the low-carbon intensity of some operations. You put that in a melting pot and the conclusion is that.

The Russians and the Middle Eastern NOCs are very well positioned to take advantage of their low-cost position. We are talking about the equivalent of USD 2-4 per barrel of oil for development and production costs. There will be a bigger challenge for Latin American and Asian NOCs because their costs are more than double that. Or there are Canadian players, which are disadvantaged by the carbon intensity of their upstream operations.

I will say one word on capital discipline. I mentioned this. Spending rates have been scaled back in the wider industry by NOCs, IOCs, majors, and all companies alike. We have seen cuts in exploration budgets and I will talk about this a little bit later on in my conclusion. In the end, it might trigger another commodity cycle that none of us like. Most of the oil companies today are investing at higher rates than the majors, but in general, it is quite important to mention a caveat here. Apart from CNOOC, Petronas, and Sinopec, the investments of most national oil companies are very much focused on domestic projects and domestic markets.

This is the reason why you now see these rapprochements that Olivier has mentioned. These are between the Russians, and those are differentiated by their scale and by their longevity. The Russians are now courting national oil companies from the Middle East. Meanwhile, the national Asian companies are still very much focusing on resource-capture initiatives in the short term, but not at any price.

We have several examples in the headlines. You are all aware of the OPEC Plus Alliance, the rapprochement between Saudi Arabia and Russia. This involves several investments or potential investments in this international gas industry. Qatar is emerging as another major shareholder in Rosneft. That is another example, with 18.95% in the USD 9 billion deal. This is because the talks with China's CFC have collapsed. These are the examples in the headline that support the hypothesis that I presented here.

Since we are talking about market share, I thought it was quite important to say a word about the chemicals business more specifically. The question that I very often get is, why is the chemical business increasingly considered to be integrated with refining capacity, with downstream investments? One example is Saudi Arabia, which aims to increase refining capacity to 8-10 million barrels a day and to double its petrochemical capacity by 2030.

The scale of the investments definitely has weight in the market of some key petrochemical products. However, it also potentially raises some concerns around the long-term financial performance of the business. The issue that we are facing in many cases is that the return on capital employed of petrochemical or chemical projects is registered in single digit percentages. However, the industry, as we all know, prefers to have 15% returns usually.

The integration with refining becomes very valuable and very important. We need much more capital discipline in the area. In the basket of opportunities, it would be great to add some quick wins in terms of mergers and acquisitions. This is to be able to build this sustainable chemical business, coupled with refining. These are the only ways that we could see to improve the financial performance of this important business for the oil industry.

The upside is that market access to the same demand growth centres targeted by oil and gas, namely China, India, South-East Asia etc. facilitate the building of brands and the building of presence. This is much more important in the petrochemical industry, and it also facilitates strategic partnerships with major corporations in those countries. However, we still need great marketing efforts and great branding efforts to be able to establish a sustainable presence in this important market for crude.

The third race that I mentioned in my introduction was around the technologies and commodities. We are faced with a situation, and I use the example of energy storage, where many countries and companies are engaged in a race to secure the minerals and materials to take leadership in clean and storage technologies. For example, it was already mentioned a few times that China has been leading global investments in renewable energy. We all know that. What has been less documented is that the country has been quite aggressive in its race to dominate in energy storage as well.

For example, by the end of 2017, the country issued a nationwide policy to boost the energy storage industry in the country. To give you some order of magnitude, the Chinese industrial capacity at the end of last year was around 389 megawatts. Between January and June of this year, so during six months of this year, they put in place new energy storage projects of around 340 megawatts. We are doubling the capacity in six months. That is across the country and in various provinces, including Guangdong, including Jiangsu etc.

I will say a word about the technologies themselves. There is hydro, where we have many countries that have installed it over the years. Apart from that, there are three other key families, lithium-ion, flow batteries, and high temperatures, all have this large cost reduction potential that I mentioned earlier. This is with the caveat that it comes with great uncertainty. For example, lithium-ion batteries for stationary applications could drop by up to 60% by 2030, and that will depend a lot on which battery chemistry we are following.

However, the stationary applications, and I insist on that, have much higher costs than the EV applications. This is because you need battery management systems and you need more hardware for the stationary applications. However, they are benefitting from the growth in the EV industry. The flow batteries are my personal favourites, not only because of the beautiful colours that we have seen in a vanadium flow battery. These batteries can drop, and their costs may drop by two-thirds between now and 2030. Here again, there is huge uncertainty, but the beauty of flow batteries is that they are independently scalable. Power and energy storage characteristics make them very much scalable and modulable, which makes them very well applicable for grid-scale solutions.

All of this rosy picture of cost decreases comes at a price, and the price I want to highlight here is the minerals and commodities on which these technologies depend. The issue that we have today is that all the technologies around energy storage revolve around just a few key commodities. We have the nickel manganese cobalt (NMC). We have copper, lithium, graphite, zinc, and now increasingly vanadium. Copper and nickel are already key industrial metals which are trading on commodities exchanges, and consumers are very used to managing supply risks.

Manganese and graphite supplies are available in sufficient quantities, but the issue now is around cobalt, and I have highlighted the price volatility in cobalt and lithium, because there are major concerns, as we know, around security of supply around those two commodities. Cobalt is primarily driving some countries' strategies including China. There are China's aggressive investments in the Democratic Republic of Congo (DRC), where 60% of supplies of cobalt are concentrated. This is quite key there, but it comes, as we know, with political instability, with conflicts over mineral issues, etc.

The industry and the research and development in energy storage is trying as much as possible to reduce its dependence on cobalt and other key commodities there. This is by switching to less cobalt-rich cathodes or trying other alternatives. The five leading lithium-ion battery manufacturers that Mr Carlos Ghosn has referred to are definitely still depending a

lot on cobalt supplies. In conclusion, we talked about the US, Russia, the Middle East, and China, and a little bit about the EU as well.

There is a lot of repositioning of alliances and changes in alliances in today's world. However, it is important to mention that there is a continuous emphasis and a continuous focus on the key fundamentals. These are growth, profitability, and increasingly trying to have a proactive technology strategy, because that is a must for the future. One key area that has been neglected so far, and I would like to finish on that, is system flexibility, which is much more neglected than system security.

I have been an advocate myself of the LNG industry as well, because it is bringing liquefied gas from the other side of the world. It is frozen at -162 degrees Celsius and -260 degrees Fahrenheit. It is beautiful technical challenge and it is a beautiful commercial challenge, but it does not necessarily answer the question of system flexibility. This is simply because the market mechanisms that we have today are not mature enough to reward system flexibility. We still have pricing mismatch. We still have arbitrage. Traders and the industry are taking advantage.

We still have market inefficiencies that prevent energy system flexibility from being properly rewarded. Ideally, we want to have more tradability and more connectivity between regions, between neighbouring countries, and with global markets. There is no secret there. We need more investments in infrastructure, in midstream and downstream infrastructure for that. That is why I surprisingly focused most of my presentation on storage.

There is a growing awareness in the industry that energy storage is of incredible and paramount importance. For example, in the country where I am based, there is a large swing in demand for example. In many countries, you have seen a massive introduction of renewable energy. In many cases, this questions the large capital investment programmes in the oil and gas part of the industry. That creates another commodity cycle, another cycle of volatility, which is definitely not in the interest of the producers and not in the interest of the consumers.

**Nobuo TANAKA**

There is one point I want to ask you about. I agree with many of the points you raised. For example, the industrial use of oil and gas will increase rather than fuel. The future of gas is not fuel for power generation. It is going be the petrochemicals as an input. Also, I understand that regarding the storage, Saudi Aramco is serious about using hydrogen as a possible way to have storage and a clean source of hydrocarbon. I mean non-carbon fuel. I talked with the CTOs of Saudi Aramco, who are taking out the carbon dioxide and putting it underground as enhanced oil recovery, capture, and storage. The hydrogen becomes a clean source. By doing so, we are exporting clean oil, as hydrogen is one of the technological options for Saudi Aramco. Are you seriously thinking of this option?

**Leila BENALI**

I am not speaking in my capacity in Saudi Aramco here, so I will not make a comment on that. I can only comment on what the industry is doing on that, and there are many initiatives. The OGCI is one of them, and a lot of the players in the industry are quite serious in investing as much as possible, as I mentioned earlier, to try to preserve market share in established markets as much as possible. This includes capturing $CO_2$ in multiple applications. That is all that I can say on that.